

1. A portable fluorescence correlation spectroscopy instrument comprising:  
an excitation source;  
at least one of a light focusing element positioned to receive light emitted  
by said excitation source;
- 5 a detector for detecting light, said detector positioned to receive light  
emitted by a sample excited by said excitation source; and  
a correlator coupled to said detector, said correlator for processing data  
received at said detector and providing data comprising autocorrelation data,  
crosscorrelation data, or a combination thereof.

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2. The instrument of claim 1, further comprising an emission filter positioned  
to transmit light to said detector, said emission filter adapted to transmit light having a  
wavelength greater than the wavelength of light emitted by said excitation source.

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3. The instrument of claim 1, wherein said light focusing element comprises a  
fiber optic.

4. The instrument of claim 1, further comprising an aperture positioned to  
receive light emitted by a sample excited by said excitation source.

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5. The instrument of claim 1, wherein said light focusing element comprises a  
focusing lens.

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6. The instrument of claim 3, wherein said fiber optic is coupled to said  
excitation source.

7. The instrument of claim 1, further comprising a second light focusing  
element positioned to focus light emitted by said excitation source in a sample volume.

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8. The instrument of claim 7, further comprising a fiber optic coupled to said  
excitation source and said first light focusing element.

9. The instrument of claim 1, further comprising a sample chamber and a second light focusing element, said first light focusing element comprising a fiber optic having a first end disposed in said sample chamber, said second light focusing element being focused on the first end of said fiber optic.

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10. The instrument of claim 9, wherein said sample chamber comprises a flow chamber.

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11. The instrument of claim 10 further comprising an emission filter positioned to receive light transmitted through said second light focusing element and to transmit said light to said detector.

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12. The instrument of claim 1, wherein said light focusing element comprises a first fiber optic coupled to said excitation source, said instrument further comprising a second fiber optic positioned to receive light emitted by a sample excited by said excitation source.

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13. The instrument of claim 12, wherein said second fiber optic is in a perpendicular relationship to said first fiber optic.

14. The instrument of claim 12, wherein said second fiber optic is in a linear relationship with said first fiber optic.

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15. The instrument of claim 1 further comprising a second light focusing element, said first light focusing element being in a perpendicular relationship to said second light focusing element.

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16. The instrument of claim 1 further comprising a second light focusing element, said first light focusing element being in a linear relationship with said second light focusing element.

17. The instrument of claim 12 further comprising an emission filter positioned to receive light from said second fiber optic and to transmit light to said detector.

18. The instrument of claim 4 further comprising an emission filter positioned  
5 to receive light from said aperture and to transmit light to said detector.

19. The instrument of claim 12 further comprising a third fiber optic positioned to transmit light from said emission filter to said detector.

10 20. The instrument of claim 1 wherein said light focusing element comprises a first fiber optic coupled to said excitation source, said instrument further comprising:

a sample chamber, an end of said first fiber optic extending into said sample chamber;

a second light focusing element; and

15 an emission filter positioned to receive light from said second light focusing element and to transmit light to said detector.

21. The instrument of claim 20, wherein said second light focusing element is focused on said end of said fiber optic.

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22. The instrument of claim 20, wherein said second light focusing element comprises a lens.

23. The instrument of claim 20, further comprising a second fiber optic positioned to receive light from said emission filter and to transmit light to said detector.  
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24. The instrument of claim 1, further comprising

a first dichromatic mirror positioned to receive light from said excitation source;

30 a second light focusing element positioned to receive light reflected from said dichromatic mirror;

a first aperture;

a third light focusing element positioned to receive light transmitted through said dichromatic mirror and through said first aperture; and  
a second dichromatic mirror positioned to receive light transmitted through said third light focusing element,

5           said first detector being positioned to receive at least one of light reflected from said second dichromatic mirror and light transmitted through said dichromatic mirror.

25.       The instrument of claim 24, further comprising a first emission filter  
10      positioned to receive at least one of light reflected from said second dichromatic mirror and light transmitted through said dichromatic mirror.

26.       The instrument of claim 25 further comprising  
15      a second emission filter positioned to receive light transmitted through said second dichromatic mirror, said first emission filter positioned to receive light reflected by said dichromatic mirror; and  
            a second detector positioned to receive light transmitted through said second emission filter.

20       27.       The instrument of claim 25 further comprising a first fiber optic positioned to receive light passing through said first emission filter and to transmit light to said first detector.

25       28.       The instrument of claim 27 further comprising a second fiber optic positioned to receive light passing through said second emission filter and to transmit light to said second detector.

30       29.       The instrument of claim 24 further comprising a first reflective mirror positioned to receive light reflected from said first dichromatic mirror and to transmit said light to said second light focusing element.

30. The instrument of claim 26 further comprising a first reflective mirror positioned to receive light reflected from said first dichromatic mirror and to transmit said light to said second light focusing element.

5 31. The instrument of claim 24, further comprising a fourth light focusing element positioned to receive light transmitted by said first dichromatic mirror and to focus said light on said first aperture.

10 32. The instrument of claim 31, wherein said second light focusing element is an infinity corrected objective and said fourth light focusing element comprises a tube lens.

15 33. The instrument of claim 26, further comprising a fourth light focusing element positioned to receive light transmitted by said first dichromatic mirror and to focus said light on said first aperture.

34. The instrument of claim 27, further comprising a fourth light focusing element positioned to receive light transmitted by said first dichromatic mirror and to focus said light on said first aperture.

20 35. The instrument of claim 28, further comprising a fourth light focusing element positioned to receive light transmitted by said first dichromatic mirror and to focus said light on said first aperture.

25 36. The instrument of claim 29, further comprising a fourth light focusing element positioned to receive light transmitted by said first dichromatic mirror and to focus said light on said first aperture.

30 37. The instrument of claim 30, further comprising a fourth light focusing element positioned to receive light transmitted by said first dichromatic mirror and to focus said light on said first aperture.

38. The instrument of claim 1, further comprising:  
a first dichromatic mirror positioned to receive light from said excitation source;  
5 a second light focusing element positioned to receive light reflected by said first dichromatic mirror;  
a third light focusing element positioned to receive light transmitted through said dichromatic mirror;  
a second dichromatic mirror positioned to receive light passing through  
10 said third light focusing element;  
a first component comprising at least one of a first aperture and a first fiber optic; and  
a first detector positioned to receive at least one of light reflected from said second dichromatic mirror through said first component and light transmitted  
15 through said second dichromatic mirror through said first component.
39. The instrument of claim 38, wherein said component is a first aperture.
40. The instrument of claim 38, wherein said first detector is positioned to  
20 receive light reflected from said second dichromatic mirror through said first component, said instrument further comprising  
a second component comprising at least one of a second aperture and a second fiber optic; and  
a second detector positioned to receive light transmitted through said  
25 second dichromatic mirror and through said second component.
41. The instrument of claim 40, wherein said first component is a first aperture and said second component is a second aperture.
- 30 42. The instrument of claim 40, wherein said first component is a first fiber optic and said second component is a second fiber optic.

43. The instrument of claim 38 further comprising a first emission filter positioned to receive light reflected from said second dichromatic mirror.
- 5       44. The instrument of claim 38 further comprising  
            a first emission filter positioned to receive light reflected from said second dichromatic mirror; and  
            a second emission filter positioned to receive light transmitted through said second dichromatic mirror.
- 10       45. The instrument of claim 43 wherein said first component comprises a first fiber optic positioned to receive light transmitted through said first emission filter and to transmit said light to said first detector.
- 15       46. The instrument of claim 45 further comprising a second fiber optic positioned to receive light passing through said second emission filter and to transmit said light to said second detector.
- 20       47. The instrument of claim 38, further comprising a reflective mirror positioned to receive light reflected from said first dichromatic mirror and to transmit said light to said second light focusing element.
- 25       48. The instrument of claim 1, further comprising:  
            a first dichromatic mirror positioned to receive light emitted by said excitation source;  
            a second light focusing element positioned to receive light reflected by said first dichromatic mirror; and  
            a first emission filter positioned to receive light transmitted through said first dichromatic mirror and to transmit light to said detector.

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49. The instrument of claim 48 further comprising a fiber optic positioned to receive light from said first emission filter and to transmit light to said detector.

50. The instrument of claim 48 further comprising an aperture positioned to receive light from said first emission filter and to transmit light to said detector.

51. The instrument of claim 48 further comprising a first reflective mirror positioned to receive light reflected by said first dichromatic mirror and to reflect said light to said second light focusing element.

10 52. The instrument of claim 1, further comprising  
a first fiber optic positioned to receive light emitted by a sample excited by  
said excitation source;

a beam splitter positioned to receive light from said first fiber optic;

15 a third fiber optic coupled to said beam splitter;  
a first emission filter positioned to receive light from said third fiber optic;  
a fourth fiber optic coupled to said beam splitter;  
a second emission filter positioned to receive light from said fourth fiber  
optic; and

20 a second detector positioned to receive light from said second emission  
filter,

said first detector being positioned to receive light from said first emission  
filter.

25 53. The instrument of claim 52 further comprising a fifth fiber optic positioned  
to receive light from said first emission filter and to transmit said light to said first  
detector.

30 54. The instrument of claim 52 further comprising a sixth fiber optic positioned  
to receive light from said second emission filter and to transmit said light to said second  
detector.

55. The instrument of claim 52, wherein said first fiber optic is in a perpendicular relationship to said first light focusing element.

56. The instrument of claim 52, wherein said first fiber optic is in a linear relationship with said first light focusing element.

57. The instrument of claim 1, wherein said excitation source is a laser.

10 58. The instrument of claim 1, wherein said excitation source is a multi-line laser.

59. The instrument of claim 1, further comprising a sample chamber.

15 60. The instrument of claim 29, wherein said sample chamber comprises a flow chamber.

61. The instrument of claim 1, further comprising an excitation light attenuation device.

20 62. The instrument of claim 1, wherein said excitation light attenuation device comprises a neutral density filter, a shutter, an acousto-optical coupler, a pockels cell, or a combination thereof.

25 63. A portable fluorescence correlation spectroscopy instrument comprising:  
a monochromatic light source;  
a light focusing device adapted to focus light emitted by said monochromatic light source on a sample;  
a detector capable of detecting light;  
a fiber optic positioned to receive light emitted by a sample excited by said  
30 light source, said fiber optic being coupled to said detector; and

a correlator coupled to said detector, said correlator being capable of processing data received at said detector and providing data comprising autocorrelation data, crosscorrelation data, or a combination thereof.

- 5           64. An article comprising:  
              a carrying case, and  
              the portable fluorescence correlation spectroscopy instrument of claim 1  
              disposed in said carrying case.
- 10          65. An article comprising:  
              a carrying case, and  
              the portable fluorescence correlation spectroscopy instrument of claim 31  
              disposed in said carrying case.
- 15          66. The instrument of claim 63, further comprising a chamber through which a liquid sample can flow, said chamber being positioned such that the confocal plane of said instrument is contained within said chamber.